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A FLUID PRESSURIZATION DEVICE

FIELD OF INVENTION

THIS INVENTION relates to a fluid pressurization device.

It relates also to an ordnance deflagration device including the fluid pressurization device.

SUMMARY OF INVENTION

According to a first aspect of the invention there is provided a fluid pressurization device including:

a pressure container defining a fixed volume, in use;

a first resiliently deformable inflatable bladder that is located within the pressure container and that is operable to contain a fluid under pressure;

a second resiliently deformable inflatable bladder that is located within the pressure container adjacent the first bladder and that is operable to contain a fluid under pressure; and

releaseable holding means for initially holding the second bladder at a fixed volume when inflated to thereby hold the fluid contained therein under pressure,

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and for releasing the second bladder thereby permitting the second bladder to expand and exert a force on the first bladder for pressurizing the fluid contained therein.

The first bladder may contain a fluid that is to be discharged from the bladder under pressure and the second bladder may contain a fluid at a relatively higher pressure than the fluid in the first bladder and that is operable to exert a force on the first bladder for pressurizing the fluid contained therein when the holding means releases its hold on the second bladder, in use.

The fluid contained in the first bladder may be a volatile fluid and the fluid in the second bladder may be a non-volatile fluid.

The first bladder may have an opening in which a valve is located, through which fluid can be introduced into and discharged from the first bladder.

The second bladder may have an opening including a valve, through which the second bladder can be inflated with fluid.

The releasable holding means may comprise a flexible sheet element that is wrapped around the second bladder to form a roll surrounding the second bladder wherein portions of the sheet element overlap and contact one another, the rolled-up sheet element being in contact with the second bladder, an inner side of the pressure container and the first bladder in an arrangement wherein frictional forces acting between said overlapping portions of the sheet element and the second bladder in a hoop direction and frictional forces acting between said sheet element and the pressure container and the first bladder, respectively, resist unrolling of the sheet element, in use.

The sheet element may be configured and the first and second bladders may be located in the pressure container, to permit gradual unrolling of the sheet element

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when fluid is discharged from the first bladder, causing a reduction in size of the first bladder and a consequent reduction in the frictional forces acting between said overlapping portions of the sheet element and the second bladder and the pressure container.

The pressure container may have a frusto-conical shape in said in-use configuration thereof.

The first bladder may have a frusto-conical shape when inflated.

The second bladder may have a frusto-conical shape when inflated.

The sheet material may be tapered towards one end thereof when viewed in plan view, thereby permitting the sheet element to form a roll around the second bladder which has a frusto-conical shape conforming substantially to the shape of the second bladder when inflated.

A relatively narrower end of the sheet element may be wrapped around a relatively narrower end of the second bladder, thereby resulting in the frictional forces acting between the overlapping portions of the sheet element in a hoop direction at said narrower ends, being relatively less than the frictional forces acting in a hoop direction between the overlapping portions of the sheet element at a relatively wider end of the sheet element.

The sheet element may be of fabric material.

The pressure container may be in the form of a flexible bag of a fabric material.

According to a second aspect of the invention there is provided an ordnance deflagration device including

a fluid pressurization device as defined hereinabove in accordance with the first aspect of the invention, wherein the fluid contained in the first bladder is combustible; and

a torch that is connected in flow communication with the combustible fluid contained in the first bladder thereby to ignite the fluid to produce a flame that can be used to burn through the casing of unexploded ordnance and into explosive material contained therein, to cause the destruction of said ordnance.

BRIEF DESCRIPTION OF THE DRAWINGS

Further features of the invention are described hereinafter by way of a non-limiting example of the invention, with reference to and as illustrated in the accompanying diagrammatic drawings. In the drawings:

Figure 1 shows a schematic perspective view, showing hidden detail, of a fluid pressurization device in accordance with the first aspect of the invention;

Figure 2 shows a side view of the pressure container of the fluid pressurization device of Figure 1;

Figure 3 shows a schematic side view of the first inflatable bladder of the fluid pressurization device of Figure 1;

Figure 4 shows a schematic side view of the second inflatable bladder of the fluid pressurization device of Figure 1;

Figure 5 shows a schematic unfolded plan view of the sheet element of the fluid pressurization device of Figure 1;

14, a second bladder 16 and releasable holding means in the form of a sheet element 18, that are located within the pressure container 12.

The pressure container 16 is in the form of a flexible bag of stitched fabric. It will be appreciated that the bag, while being flexible, has a fixed maximum volume when in a fully open condition. The pressure container 12 has two ends 20 and 22 with the end 22 being narrower than the end 20. As such, the pressure container 12 has a generally frusto-conical configuration when fully open. The end 20 of the pressure container 12 defines an opening 24.1 and the end 22 defines an opening 24.2.

The first bladder 14 is of resiliently deformable rubber and has two ends 26 and 28. The first bladder has a shape and dimensions identical to the shape and dimensions of the pressure container 12. The first bladder 14 defines an opening 30 at its end 26 in which a pipe connector 32 including a tyre valve 33, is located.

The second bladder 16 is of resiliently deformable rubber and has a first end 34 and a second end 36. The second bladder 16 has a shape and dimensions identical to the shape and dimensions of the pressure container 12. The second bladder 16 has an opening 38 at its end 36 in which a pipe connector 40 including a tyre valve 39, is located.

The sheet element 18 is of flexible fabric and has two ends 42 and 44. The fabric is formed by taking a rectangular sheet of fabric material and cutting off the corners of the sheet near its end 44, thereby providing the sheet element 18 with a tapered region 46 near its end 44.

The first and second bladders are located in the pressure container adjacent one another with the pipe connector 32 of the first bladder 14 extending through the hole 24.1 of the pressure container 12 and the pipe connector 40 of the second bladder 16 extending through the hole 24.2 of the pressure container 12.

CLAIMS

1. A fluid pressurization device including:

a pressure container defining a fixed volume, in use;

a first resiliently deformable inflatable bladder that is located within the pressure container and that is operable to contain a fluid under pressure;

a second resiliently deformable inflatable bladder that is located within the pressure container adjacent the first bladder and that is operable to contain a fluid under pressure; and

releaseable holding means for initially holding the second bladder at a fixed volume when inflated to thereby hold the fluid contained therein under pressure, and for releasing the second bladder thereby permitting the second bladder to expand and exert a force on the first bladder for pressurizing the fluid contained therein.
2. A fluid pressurization device as claimed in Claim 1, wherein the first bladder contains a fluid that is to be discharged from the bladder under pressure and the second bladder contains a fluid at a relatively higher pressure than the fluid in the first bladder and that is operable to exert a force on the first bladder for pressurizing the fluid contained therein when the holding means releases its hold on the second bladder, in use.
3. A fluid pressurization device as claimed in Claim 2, wherein the fluid contained in the first bladder is a volatile fluid and the fluid in the second bladder is a non-volatile fluid.

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4. A fluid pressurization device as claimed in any one of Claims 1 to 3, wherein the first bladder has an opening in which a valve is located, through which fluid can be introduced into and discharged from the first bladder.
5. A fluid pressurization device as claimed in any one of Claims 1 to 4, wherein the second bladder has an opening including a valve, through which the second bladder can be inflated with fluid.
6. A fluid pressurization device as claimed in Claim 1 to 5, wherein the releasable holding means comprises a flexible sheet element that is wrapped around the second bladder to form a roll surrounding the second bladder wherein portions of the sheet element overlap and contact one another, the rolled-up sheet element being in contact with the second bladder, an inner side of the pressure container and the first bladder in an arrangement wherein frictional forces acting between said overlapping portions of the sheet element and the second bladder in a hoop direction and frictional forces acting between said sheet element and the pressure container and the first bladder, respectively, resist unrolling of the sheet element, in use.
7. A fluid pressurization device as claimed in Claim 6, wherein the sheet element is configured and the first and second bladders are located in the pressure container, to permit gradual unrolling of the sheet element when fluid is discharged from the first bladder, causing a reduction in size of the first bladder and a consequent reduction in the frictional forces acting between said overlapping portions of the sheet element and the second bladder and the pressure container.
8. A fluid pressurization device as claimed in Claims 7, wherein the pressure container has a frusto-conical shape in said in-use configuration thereof.

9. A fluid pressurization device as claimed in claim 8, wherein the first bladder has a frusto-conical shape when inflated.
10. A fluid pressurization device as claimed in claim 9, wherein the second bladder has a frusto-conical shape when inflated.
11. A fluid pressurization device as claimed in any one of Claims 10, wherein the sheet material is tapered towards one end thereof when viewed in plan view, thereby permitting the sheet element to form a roll around the second bladder which has a frusto-conical shape conforming substantially to the shape of the second bladder when inflated.
12. A fluid pressurization device as claimed in Claim 11, wherein a relatively narrower end of the sheet element is wrapped around a relatively narrower end of the second bladder, thereby resulting in the frictional forces acting between the overlapping portions of the sheet element in a hoop direction at said narrower ends, being relatively less than the frictional forces acting in a hoop direction between the overlapping portions of the sheet element at a relatively wider end of the sheet element.
13. A fluid pressurization device as claimed in Claim 6, wherein the sheet element is of fabric material.
14. A fluid pressurization device as claimed in any one of the preceding claims, wherein the pressure container is in the form of a flexible bag of a fabric material.
15. An ordnance deflagration device including

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a fluid pressurization device as claimed in any one of Claims 1 to 14 wherein the fluid contained in the first bladder is combustible; and

a torch that is connected in flow communication with the combustible fluid contained in the first bladder thereby to ignite the fluid to produce a flame that can be used to burn through the casing of unexploded ordnance and into explosive material contained therein, to cause the destruction of said ordnance.

16. A fluid pressurization device substantially as described in the specification.
17. A fluid pressurization device substantially as described in the specification, with reference to and as illustrated in the accompanying diagrammatic drawings.
18. An ordnance deflagration device substantially as described in the specification.
19. An ordnance deflagration device substantially as described in the specification, with reference to and as illustrated in the accompanying diagrammatic drawings.